the temperate regions of South America. They attain their best development during the moist periods of the year but they are by no means restricted to humid regions.

HOSTS

The number of known hosts to these parasitic fungi is continually increasing and 2,000 host species is probably a conservative estimate. Some idea of the wide variety of hosts may be obtained from the following very incomplete list, many of which are of economic and horticultural importance: alder, apple, bean, Boston ivy, barberry, birch, clover, Coreopsis, cucumber, currant, dandelion, dahlia, elm, elderberry, Euonymous, Gaillardia, grape, hop, honeysuckle, lupine, marigold, mustard, maple, oak, peach, phlox, pear, pea, poplar, rose, strawberry, tobacco, violet, verbena, willow and walnut, as well as numerous species of grass.

GENERAL CHARACTERISTICS

Many species of these fungi are known to occur in great abundance, and they all have the same general characteristics. The vegetative portion of mycelium is, with few exceptions, superficial to the host, often forming a white or hyaline, felt-like mass over the surface of leaves and young stems. Simple or lobed haustoria enter the stomata or other vulnerable points of the host, and through these the fungus absorbs nourishment. The mycelium is branched and made up of uninucleate cells.

Reproductive bodies produced in the spring and early summer are to be found in large numbers. They are simple, one-celled structures formed in chains on scattered conidiophores (Fig. 2). There is so little morphological difference between the conidiospores (Figs. 3, 4, and 5) of the various species of powdery mildews that these are of little value in their identification. They are usually barrel- or egg-shaped. Under proper conditions of moisture and temperature they will germinate almost immediately, producing a new mycelium and another crop of conidiospores within a few days. These masses of mycelia, with their conidiophores and conidiospores, cause the powdery spots on the leaf surface (Fig. 1). Under proper environmental conditions the conidiospores are released into the air in enormous numbers. They are small, 65-80μ in diameter by 130-150μ in length, and are readily carried by air currents.

Genera and species in the family are distinguished not so much by the conidial characters as by the type of perithecia (Fig. 6) or resting structures resulting from sexual reproduction. They are produced in the fall and appear as black or dark brown spheres just visible to the naked eye. They may occur in abundance. Within them are produced the ascospores which carry the fungus over the unfavorable growing season. *Microsphœra Alni* may be distinguished from all other powdery mildews by the intricately branched appendages (Fig. 6) on the perithecium.

In November, 1939, perithecia in abundance were found on the same oak trees which had produced conidiospores in the spring. The leaves were not yet shed, and the relatively thin white mycelium and many black appendaged perithecia were scattered over the upper leaf surface (Fig. 1). The spores of these fungi may be the cause of many of the baffling and unexplained allergic cases which so frequently appear. The millions of readily dispersable conidiospores produced by a single infection and the great abundance of the fungi of this group on a wide variety of hosts render these plants ideal as a causative agent of asthma and hay fever.

The authors wish to thank Professor H. E. McMinn of Mills College for his coöperation in this work.

400 Twenty-Ninth Street.
Mills College.

REFERENCES

1. Storm van Leeuwen, W.: Allergic Diseases. Philadelphia: J. B. Lippincott Co., 1925.
2. Brown, G. T.: Hypersensitiveness to Fungi, J. Allergy, 7:455, 1936.
3. Schonwald, Philip: Allergic Molds in the Pacific Northwest, J. Allergy, 9:175, 1938.

COMMON DUCT LESIONS: THEIR SURGICAL MANAGEMENT*

L. A. Alesen, M. D.
Los Angeles

IT is not the purpose of this paper to present any startling innovation in the management of lesions of the common duct, however much that might be desired. Rather, it is the intent to focus attention upon the fact that we are at present in possession of sufficient information and have at our disposal adequate technical procedures to permit of a somewhat standardized approach to this admittedly difficult field with a view toward the material improvement of our end-results.

Recent advances in our knowledge concerning the normal and abnormal physiology of the liver, the cause and prevention of cholemic bleeding, renewed interest in the hepatorenal syndrome, as well as a realization that the malignant lesions affecting the common duct may be successfully attacked by the same principles of early diagnosis and radical extirpation as are successful in the treatment of cancer elsewhere about the body, have all combined to generate a more optimistic spirit than formerly prevailed.

CLASSIFICATION

Since the ultimate effect of common-duct lesions is to encroach upon or obliterate the lumen of the duct and thus interfere with its function of carrying bile from liver to duodenum, these lesions may be classified as (1) those causing pressure from without, (2) those causing pressure from within the lumen, and (3) those arising within the wall of the duct itself.

Of lesions causing pressure from without, carcinoma of the head of the pancreas is by far the

* From the Department of Surgery, College of Medical Evangelists, and the Surgical Service of the Los Angeles County General Hospital.

Read before the San Diego County Medical Society, April 8, 1941.

most common, followed in frequency by metastatic malignancies arising elsewhere, enlarged glands, Hodgkin's disease, or other lymphoblastomata. Another important cause of obstruction arising from without the duct is chronic interlobular pancreatitis. Stones form the only important cause of obstruction arising within the lumen of the common duct, although instances of obstruction by worms such as ascaris lumbricoides, and liver flukes are on record. Of the disturbances arising within the wall of the common duct itself, benign stricture, usually due to operative trauma, is by far the most frequently seen. Benign tumors, such as papilloma, adenoma, lipoma, fibroma, and neurofibroma, have been recorded, but these are rare. Malignant tumors, while infrequent, are not rare, and are practically always carcinoma.

DIAGNOSTIC PROBLEMS

The most common and prominent symptom of common-duct involvement is jaundice. Thus, the differential diagnosis involves the consideration of all conditions which may give rise to a visible deposit of bilirubin in the tissues. McNee classifies jaundice as follows: (1) hemolytic; (2) hepatogenous; and (3) obstructive. With the first two causes, we are concerned as a matter of elimination. The diagnostic problem in common-duct disorders is to determine, insofar as is possible before operation, the nature and location of the obstructing agent.

The history of a recent surgical attack upon the biliary tract preceding the onset of jaundice, or the presence of an external biliary fistula, are suggestive evidence that the lesion is traumatic, although there must be borne in mind the frequent occurrence of a missed common-duct stone. A positive direct Van den Bergh response indicates, of course, an obstructive type of lesion. But if the jaundice is of considerable duration, the response may not be sharp-cut and may be diphasic, indicating both obstructive and hepatogenous types of jaundice. The galactose tolerance test and the hippuric acid test are of some value in indicating rather marked liver damage. Also, in severe hepatic dysfunction, the blood cholesterol and cholesterol esters are definitely depressed.

STONE AND MALIGNANT OBSTRUCTIONS

The differential diagnosis between stone and malignant obstructions of the common duct is difficult and often impossible to make prior to exploration. Courvoisier's law, which postulates an enlarged soft gall-bladder in the presence of malignant obstruction, and a hard, shrunken gall-bladder in the presence of calculus, are helpful in certain instances, but not entirely reliable. The intermittent nature of the jaundice in calculus disease, together with the chills and fever known as Charcot's syndrome, are of some value in differentiation. Recently, Watson has stressed the importance of the variation in the amount of urobilinogen in urine and feces in the various pathologic instances causing jaundice. He found that in cases of the stone in the common duct there were always present appreciable quantities of urobilinogen in both urine and feces, although these quantities might be somewhat less than those found in normal individuals. However, in obstruction due to malignancy there was found little, if any, urobilinogen in either feces or urine. He stressed the necessity of making these determinations upon specimens collected over five-day periods and averaging the results.

Pain is not a reliable symptom from the standpoint of diagnosis, because of its great variability. Frequent gastro-intestinal hemorrhage in a jaundiced patient is suggestive of carcinoma of the ampulla of Vater. The x-ray sometimes shows a widening of the duodenal "C" in cases of carcinoma of the head of the pancreas, together with other distortion of the duodenal outline, not at all conclusive.

PREOPERATIVE MEASURES

The liver has been called the commissariat of the body. Its functions are many and varied, the most important of these being its rôle in the metabolism of carbohydrate, protein, fat, and vitamins; the secretion of bile; a part played in the process of hemopoiesis; and in the maintenance of substances necessary for the coagulation of blood. Thus, an active preoperative appraisal of its status is essential. In a jaundiced patient the hippuric acid test is of value in estimating the degree of risk. If, following a dose of six grams of sodium benzoate, there is excreted one gram or less of hippuric acid in four hours, surgery is hazardous. If the secretion is five-tenths of a gram or less, surgery is absolutely contra-indicated.

Of cardinal importance is information concerning the bleeding tendency. This is measured by means of the Quick prothrombin clotting time, which estimates the patient's clotting ability as a definite percentage of a normal control, and thus reflects quite accurately any deviation from the normal prothrombin content. This bit of information and its practical application in the prevention of cholemic bleeding are the most recent outstanding contribution to bile-tract surgery. The level of the blood protein is also of importance. In prolonged and severe hepatic damage there is usually a definite decrease in both the blood albumin and the globulin, with a reversal of the usual ratio of two parts of albumin to one of globulin. Renal function and urea clearance should be ascertained. The level of serum bilirubin is important. Operation is less hazardous when performed in the presence of a more or less stabilized serum bilirubin level, even though that be quite high than if done when the level is advancing quite rapidly. Given a jaundiced patient upon whom it is proposed to perform an operation for biliary obstruction, it is highly desirable to restore that patient's liver and renal physiology to as nearly a normal state as possible before the operation is performed.

Diet.—The diet should be high in carbohydrates, containing from 350 to 500 grams daily. Often intravenous glucose is necessary in order to insure that amount. It has been demonstrated by Bollman and Mann that in the experimental dog with biliary obstruction a diet of meat exclusively is not tolerated, but that the same animal will survive months

on a diet of milk and syrup. Meat, or meat extractives, developed ascites in such an animal, but milk and eggs did not favor such a result. Therefore, the daily intake of protein in a jaundiced patient should be from one to two grams of vegetable and dairy protein per kilogram body weight, with the addition of just enough meat to increase the palatability of the diet.

Inasmuch as a damaged liver is unable to handle fat well, the amount of fat should be limited to 45 or 50 grams per day.

The patient with an impaired liver needs larger quantities of vitamins than are contained in normal diets. Walters and Snell, in their book "Diseases of the Gall-bladder and Bile Ducts," recommend the daily administration of oleum percomorphum 30 minims; orange juice,12 ounces; Valentine's extract of liver, 2 ounces; parenteral crystalline thiamin chlorid, 3 to 9 milligrams, brewer's yeast tablets (Harris or Mead), 3 to 5 with each meal. Vitamin K, in the form of Klotogen (Abbott) or some other reliable preparation, should be given in doses of a thousand units three times a day, together with bile salts in doses of at least ten grains three times daily. The prothrombin clotting time should be checked just before operation to assure that it has attained approximately normal values; that is, a clotting time of twenty seconds. In patients with lowered blood protein there is no substitute for transfusion of whole blood or plasma.

POSTOPERATIVE COMPLICATIONS

If the patient has been well prepared, as above outlined, with due regard for the prevention of the two most important postoperative complications, that is, cholemic bleeding and hepatic insufficiency, postoperative care should not be so difficult. Administration of glucose intravenously is still the sheet anchor of postoperative care. Postoperative administration of Vitamin K and bile salts should be continued for several days, unless and until the prothrombin clotting time is shown to be normal. Occasionally, notwithstanding satisfactory preoperative preparation, the symptoms of hepatic insufficiency, or the hepatorenal syndrome, supervene. This condition is to be suspected when the patient becomes stuporous, restless, or the urinary output decreases and the blood urea increases, when jaundice deepens and when drainage from a T-tube, which had formerly been satisfactory, becomes thin and watery.

Oxygen is of value, together with transfusion, to improve the oxygen transport system of the blood. If these measures fail, the intravenous use of one or two per cent sodium lactate in normal salt, 1,000 cubic centimeters once or twice daily, is often useful.

Postoperative atelectasis, as the forerunner of postoperative pneumonia, should always be considered in the presence of a rapid pulse with cyanosis or evidence of respiratory embarrassment. For the treatment of postoperative shock, next in value to transfusion of whole blood or plasma, is a 6 per cent solution of acacia in normal salt, 500 cubic centimeters given intravenously.

TRAUMATIC STRICTURES

The best treatment for stricture or other abnormalities of the common duct, consequent upon operative trauma, is their prevention. To avoid such injuries an intimate knowledge of the usual anatomy of the extrahepatic biliary tract, and the structures of the hepatoduodenal ligament together with their frequent variations, is essential. In operating upon these structures, it is inexcusable to sever or ligate any one of them without making absolutely sure of its relationship to the other vital parts. Probably the most common error in this connection is the ligation of the right hepatic artery in place of the cystic artery, thus diminishing greatly, if not completely stopping, the blood supply to the right lobe of the liver, and often causing death, with symptoms usually ascribed to hepatic insufficiency or the so-called "liver death," which is not in reality a liver death at all in the accepted sense.

Another disastrous mechanical error is the partial or complete severance of the common duct because of its inclusion in the clamp around the cystic duct. Whether one performs the operation of cholecystectomy from below upward, or from above downward, makes very little difference, provided he uses that technique with which he is thoroughly familiar and follows the cardinal principles of identifying the anatomy before severing or ligating any structure.

Another important prophylactic point in all attacks upon the common duct is to explore the duct thoroughly and ascertain insofar as possible the kind of abnormality present before the gall-bladder is sacrificed. This will permit a later anastomosis of the gall-bladder to the intestinal tract in case the common-duct lesion is such as to preclude its removal and at the same time maintain duct continuity. Complete severance of the common or hepatic duct occurring during surgery, and recognized at the time, should be repaired immediately by suturing around a T-tube.

Benign common-duct stricture following surgical trauma presents itself in several different forms, depending upon the level at which the duct is occluded. The simplest is the narrow annular stricture occurring in the readily accessible portion of the duct. This is best treated by a longitudinal incision through the stricture and transverse closure. Complete occlusion of the common duct below the cystic duct, under circumstances which permit the mobilization of the proximal and distal ends, is repaired by interrupted sutures around a T-tube. This usually gives excellent results, provided undue tension can be avoided by satisfactory mobilization of the divided ends. If it is impossible to mobilize enough of the distal end to permit satisfactory anastomosis, then the common duct or the hepatic duct must be implanted into the duodenum or the jejunum, a process being known as choledocho or hepatico-enterostomy, performed after the method of W. J. Mayo. Usually a rubber tube or catheter is employed as a foundation for such anastomosis, and in order to insure the patency of

the opening while healing occurs. In instances in which the occlusion lies high in the hepatic duct, or involves both the right and left hepatic ducts, it is sometimes necessary to implant these ducts separately into the duodenum or jejunum, this procedure often being technically very difficult.

The Kehr operation is suggested for those instances in which it is impossible to identify either right or left hepatic duct for the purpose of anastomosis with the intestinal tract. This is performed by denuding an area on the under surface of the right lobe of the liver about one by two inches; then with deep thrusts of the pencil-tip, cautery openings are made into the substance of the liver, thus opening up several bile radicals. A loop of jejunum is anastomosed snugly to the area of liver so denuded. This operation is called hepatojejunostomy. Its application is very limited, and its success highly questionable.

The implantation of an external biliary fistula into the duodenum or jejunum has been successfully accomplished on several occasions. The fistula is mobilized by careful dissection sufficiently to permit its introduction and suture into the duodenum or jejunum. Lahey has emphasized the necessity of leaving as much of the fistula as possible in contact with the under surface of the liver in order to facilitate its blood supply. All of the implantation operations are subject to the frequent occurrence of ascending cholangitis and the development of stricture in the anastomoses so formed, but they do offer considerable to a patient afflicted with this kind of biliary obstruction.

On my service at the Los Angeles County General Hospital a year ago, I performed an hepaticoduodenostomy on a woman for a lesion of the common duct not amenable to other repair. Her postoperative course was not particularly stormy. From time to time, she experiences some distress in the upper abdomen, with slight jaundice and low-grade fever. Her stools are normal in color. She is undergoing recurrent attacks of low-grade cholangitis, but it is believed her ultimate outlook is good.

STONE IN THE COMMON BILE DUCT

Stone in the common bile duct occurs far more frequently than was formerly believed. Authorities differ in their estimates of frequency, some stating that one patient in five suffering with stones in the gall-bladder has common-duct stones, while others place the estimate as high as one in three. As the result of this viewpoint, more common ducts are being explored for stone in connection with the operation of cholecystectomy for stones in the gall-bladder. It is pretty generally agreed that, in addition to the cholecystectomy for stones in the gall-bladder, the common duct should be explored in patients giving history of rather intense or prolonged jaundice, intermittent fever, and in whom the common duct is enlarged, thickened, or is seen to have lost its normal bluish color. Some operators go as far as to contend that all common ducts should be explored in the presence of stones in the gall-bladder.

The removal of a stone from the comon duct may be very easy or extremely difficult. It is not our purpose to outline at length the various technical maneuvers involved, but it may be said that in this field of surgery one's ingenuity is taxed to the utmost.

Supraduodenalcholedochotomy, retroduodenalcholedochotomy preceded by the mobilization of the duodenum by the method of Kocher, transduodenalcholedochotomy, all have their places and particular indications. It is our custom to drain the common duct with a T-tube in every instance in which it is opened or explored.

One of the most annoying features of surgery for stone in the common duct is the stone that was missed at operation. This is to be suspected when, following cholecystectomy or choledochotomy, the patient develops upper abdominal pain, intermittent fever, and jaundice. To obviate overlooking a stone at operation, there has developed the practice of cholangiography. Lipiodol or hippuran is injected and an x-ray taken immediately. This entails some time and inconvenience, but is often worth the effort.

BILIARY DYSKINESIA

Both the medical and surgical literature during the past few years have contained frequent references to a condition called biliary dyskinesia. This term describes a spasm of the sphincter of Oddi, and is used in explanation of the poor result notoriously known to follow cholecystectomy for chronic cholecystitis without stones. Working upon this principle, Colp, Doubilet, and Gerber, at the Mount Sinai Hospital, have developed an instrument for the incision of the sphincter of Oddi through the common duct. They have reported several favorable instances of the use of this instrument and contend that it is perfectly safe. Their instrument is introduced through the ordinary choledochotomy incision, directed into the duodenum and then pulled backward, upon which a projecting tooth-like blade engages in the upper portion of the sphincter and removes a small wedge-shaped piece of that structure. Working entirely independently and antedating the work of Colp, Doubilet, and Gerber, according to his statement, Otto DeMuth of Vancouver has developed an instrument for the same purpose, but of a slightly different construction. His instrument is the usual olive-tipped bougie in which is fashioned a small knife. The function of the knife is to incise the sphincter Oddi, but not to excise a portion of its tissue; thus DeMuth claims that the possibility of hemorrhage is entirely obviated. This instrument has particular bearing upon the problem of missed stone in the common duct. It is stated by DeMuth that he has not had an instance of recurrent or missed stone in the common duct since the use of his instrument, inasmuch as the relaxed sphincter of Oddi makes it very easy for the common duct to expel such a stone. There should be mentioned, in passing, also the operation of Reich, in which the sympathetic innervation of the sphincter of Oddi is destroyed by careful dissection of the plexus around the lower end of the common duct.

RETAINED STONE

If, during the postoperative course of a patient with a T-tube in his common duct, there is reason to suspect the presence of a retained stone, cholangiography is performed. If such a stone is shown to be present, it may be fragmented and dislodged by the method of Pribram, consisting of the instillation of 2 to 3 cubic centimeters of ether into the T-tube and the administration of amylnitrite by inhalation. Best, of Omaha, has done considerable work in this field and has developed a technique that he calls his flush of the bile tract. This consists essentially of the use of nitroglycerin or amylnitrite, Epsom salts, and olive oil, by mouth or by duodenal tube, and atropin by mouth or hypodermic. Quite often it is possible to dislodge and expel a retained stone by these methods. Their failure, of course, indicates reoperation, which is always a much more hazardous and difficult procedure than the original operation.

Benign neoplastic lesions are very rare. When they occur in accessible locations in the duct, they can be removed by segmental resection and anastomosis of the duct over a T-tube.

Malignant lesions, practically always carcinoma, while not frequent are not rare. They may occur in any location along the course of the duct from either the right or left hepatic duct, their juncture, the juncture of the common hepatic with the cystic and along the course of the common duct or in the ampulla of Vater.

CHRONIC INTERLOBULAR PANCREATITIS

One important condition causing obstruction to the common duct by pressure from without is chronic interlobular pancreatitis. It is said that this is most often due to present or previous stone in the common duct or in the pancreatic duct, but often at operation the stone cannot be detected. The patient presents a history of gradually increasing jaundice, with vague upper abdominal distress. At operation the external biliary tract is found to be essentially normal, except that the common duct and gall-bladder may be somewhat dilated. There is found a rather hard, diffuse mass in the head of the pancreas. Exploration of the common duct reveals no stone, but some obstruction due to the pressure of this mass. The difficulty lies in differentiating between chronic pancreatitis and carcinoma of the head of the pancreas. This is often impossible at the operating table. One case history will illustrate this condition.

REPORT OF CASE

The patient was a well-developed white female, age thirty-eight years, who consulted me in 1933, complaining of abdominal pain, nausea, and vomiting, with an onset of about nine weeks previously. She had been quite jaundiced at times. She complained of sour stomach, pain occurring about four hours after meals; had lost twelve pounds during the period of her illness. Examination revealed slight visible jaundice, with some tenderness over the gall-bladder region. X-ray examination revealed a poorly functioning gall-bladder, but showed no stones. At operation the gall-bladder was found to be rather markedly dilated, soft, and contained no stones. The common duct was dilated, but no stones were palpable. There was a mass in the head of the pancreas about the size of a hen's egg, irregular, nodular, firm. The remainder of the pancreas was firmer than normal. A small piece of the pancreas was removed for biopsy. This removal occasioned considerable sharp hemorrhage, which was finally controlled by suture. The biopsy showed only chronic pancreatitis, but it was felt at the time that a representative portion of the gland had not been obtained; therefore, the diagnosis at the table was carcinoma. A cholecystduodenostomy was performed. The patient's postoperative convalescence was uneventful. In September, 1934, or fifteen months after the operation, she was delivered of a normal infant. Today her health is entirely satisfactory. She shows no symptoms referable to the gastro-intestinal tract or any evidence of metastatic malignancy; thus confirming the diagnosis of chronic pancreatitis.

LOS ANGELES COUNTY GENERAL HOSPITAL STATISTICS

At the Los Angeles County General Hospital, from the years 1929 to 1938 inclusive, there were 124 instances of carcinoma involving the head of the pancreas, the common duct, or the ampulla of Vater. Of these, 112, or 90.4 per cent, involved the head of the pancreas; nine, or 7.2 per cent, the common duct; and three, or 2.4 per cent, involved the ampulla of Vater. Thus, there is seen the great preponderance of these lesions in the head of the pancreas.

An effort was made to determine from the records of these patients their operability from the standpoint of radical removal of the pathologic process. In the records of seventy-five of these patients there was sufficient information on which to base an opinion. Of these seventy-five, there were thirty-two with definite local or distant metastasis—42.6 per cent. There were forty-three, or 57.4 per cent, without local or distant demonstrable metastasis; thus, almost 60 per cent of these patients, presumably, were entitled to an attempt at radical removal of their carcinoma. While in rare instances it might be possible to excise a well-localized malignancy of the free portion of the common duct and effect an end-to-end anastomosis of the severed ends, such a local incision would not conform to the accepted principles for the treatment of cancer; that is, widespread removal of the growth and surrounding tissues. Also, there are a number of instances on record of local removal of a carcinoma in the ampullary region, but such removals have practically always been followed by early recurrence.

WHIPPLE PANCREATICODUODENECTOMY

It is to deal with the problem of carcinoma in the region of the head of the pancreas, in accordance with the modern accepted principles of radical widespread excision, that the Whipple pancreaticoduodenectomy has been devised. Fundamental to the use of this operation is the understanding, proved by animal experimentation and subsequent clinical operation or observation, that the external secretion of the pancreas is not essential for life or a fair degree of health.

Since it is usually difficult, if not impossible, to differentiate at operation between a malignancy of the common duct and one arising in the head of the pancreas, and since this distinction is of no particular importance as regards the procedure to be

employed, the only important considerations are to determine whether or not local or distant spread has occurred. Otherwise, with a patient in fairly good condition and satisfactory preoperative preparation, the Whipple operation is the procedure of choice if one wishes to make an attempt to cure his patient. It is a prolonged operation, quite shocking, but the ends to be achieved are worth the risk. It is performed in two stages. The first stage consists of double ligation of the common duct with heavy linen and its incision between these ligatures. The ligature on the distal end is left long for identification at the second stage. The small bowel is divided about 12 to 15 inches distal to the ligament of Treitz, an end-to-side enterostomy is performed, and the fundus of the gall-bladder is anastomosed to the distal end of the jejunum. This is all of the first stage. The second stage is performed two or three weeks later, following satisfactory recovery from the first operation. The distal end of the severed common duct is identified by its long ligature. Posterior gastroenterostomy is performed. The gastroduodenal artery is identified and ligated. The entire duodenum and a large wedge-shaped portion of the head of the pancreas are excised en bloc. The ducts of Santorini and Wirsung are ligated with heavy silk or linen, and the pancreatic remnant is ligated with interrupted sutures of silk. One drain is placed in the pancreatic bed so formed. While this operation is indeed radical and its immediate mortality high, it offers the only present opportunity for complete radical cure of malignant lesions in this region.

In a recent personal communication, Doctor Whipple stated that his present tendency is to perform the entire operation in one stage in individuals who are in good condition and seem able to tolerate it. The only feasible alternative procedure is an anastomosis between the gall-bladder and the intestinal tract, preferably the duodenum. This is to be performed when the growth has extended beyond limits permitting of its radical removal, or when the patient's condition will not permit consideration of the Whipple operation. It offers, at best, only temporary palliation, records showing that the average life expectancy after these palliative procedures is about seven and a half months.

SUMMARY

In the surgical management of lesions of the common duct, a thorough understanding of normal and abnormal liver physiology is essential.

Recent advances in our knowledge of liver function are applied to common-duct obstruction.

The surgical treatment of operative strictures and the management of common-duct stones are outlined.

Missed stone and its treatment are discussed.

The principles used in the successful treatment of carcinoma of the body elsewhere are equally applicable to carcinoma involving the common duct and its neighboring structures.

The Whipple operation presents a practical application of these principles.

1401 South Hope Street.

SYPHILIS: FIVE-DAY TREATMENT*

NORMAN N. EPSTEIN, M. D.
San Francisco

THE five-day treatment of syphilis, as introduced by Hyman, Chargin, and Leifer,[1] represents an attempt to eradicate early syphilis by means of a massive dose of an arsenical spirocheticide administered intravenously by the continuous drip method. In 1931 Hirschfeld, Hyman, and Wagner[2] showed that large amounts of a toxic substance may be given intravenously without untoward reactions, provided this substance is introduced into the blood stream with sufficient slowness. They concluded that many of the toxic reactions which follow intravenous injections are the result of speed shock. Applying this principle to the treatment of early syphilis, Hyman, Chargin, and Leifer have attempted to reach Ehrlich's original goal, namely, the total sterilization of the patient from spirochetes by one massive dose of arsphenamin.

STUDIES AT MOUNT SINAI HOSPITAL

A symposium on this subject held at Mount Sinai Hospital, New York City, on April 12, 1940, created considerable interest in this work, among both medical men and the lay public. The importance of this investigation is indicated by Moore,[3] who, in discussing the papers presented on that occasion, stated: "This investigation may represent the most important advance in the treatment of syphilis since the original discovery of arsphenamin by Ehrlich in 1909." This method of treatment is still in the experimental stage and is being investigated by the group of workers at Mount Sinai Hospital. At this institution an organization has been set up for the proper execution of the technique and for a thorough follow-up of the patients from both the clinical and the laboratory standpoint. We agree with these workers that the administration of this treatment should be confined to that institution until its merits and dangers have been completely evaluated.

The purpose of this paper is to present a critical review of the published reports and to comment on certain aspects of the problems involved.

REVIEW OF PUBLISHED REPORTS

As a result of the symposium at Mount Sinai Hospital, a series of nine papers[3] was published in August, 1940, which presents the most recent data on massive arsenotherapy in early syphilis (the five-day treatment of early syphilis).

Method of Treatment.—From 1933 to 1938, neoarsphenamin was used in treating ninety-three patients with primary or secondary syphilis by the five-day method. A freshly prepared solution, consisting of 0.1 gram neoarsphenamin dissolved in 100 cubic centimeters of 5 per cent glucose, was administered by intravenous drip at the rate of

* From the Department of Dermatology and Syphilology, Division of Medicine, University of California Medical School, San Francisco.

Read before the Section on Dermatology and Syphilology at the seventieth annual session of the California Medical Association, Del Monte, May 5–8, 1941.